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DESCRIPTION drawing roll for sheet materials, in particular for paper or Kartonbahnen, plastic or Metallfolien

Technical field the invention relates to a drawing roll for sheet materials, in particular for paper or Kartonbahnen, plastic or Metallfolien, which around a fixed interior construction unit exhibits rotary drivable jacket, which exhibits air intake openings on its entire outer surface. The interior of the jacket is into segmentförmige chambers divided, by which the chamber with vacuum, disposed within the looping range of the web, is subjectable. By the vacuum will the web to the roller sucked, in order to increase and so larger tensile forces into the web to introduce be able the adhesive forces.

State of the art preferred one such drawing rolls become, in plants for the Herstellung and/or refinement of sheet materials (paper or Kartonbahnen, plastic or metal foils) in ranges inserted, possible in which a force application is only at a course side, for example because on the other course side flüssiges coating material applied is (DE-AS 14 74 973).

With higher web speeds the prepared air boundary layer when accumulating the web on the roller of problems, adherent at the web. An air cushion between the web and the roller, some Aufschwimmen of the web caused and so the Kontaktfläche reduced forms. The reduction of the Kontaktfläche leads to the fact that smaller tensile forces transmitted to become to be able. In the extreme case the roller revs the bottom web up.

Illustration of the invention of the invention is the basis the object to improve a drawing roll of the initially described type in such a way that also with high web speeds large tensile forces are more transferable.

This object becomes 1 dissolved with the features of the claim.

The upstream second vacuum chamber possible it to suck the air boundary layer off of targeted in that measures appended at the web that the contact area sufficient large remains, in order to know the required tensile forces transmitted.

A second object of the invention consists of making a drawing roll available whose surface is adaptable simple on various web materials, speeds and/or web widths.

This object becomes 5 dissolved with the features of the claim.

The Unteransprüche there particularly contain preferred, advantageous embodiments of a drawing roll according to invention.

Brief description of the drawing the drawing serves the invention for the explanation on the basis a simplified represented embodiment: Fig 1 shows a cross section by the drawing roll, fig 2 shows a longitudinal section toward the axis of rotation, fig 3 shows a Zusammenbauzeichnung the releasable parts, and fig 4 shows the members as schematic diagram for adjustment the required Pressure ratios in the individual chambers.

Paths to the embodiment of the invention the Zugwaize after the invention will in plants for the production and/or refinement of sheet materials (paper or Kartonbahnen, plastic or Metallfolien) inserted, in order to pull the web with an high, accurate defined speed and/or a defined course curve by single asset areas. Such plants are for example coating, impregnating, cover or laminating plants or plants to the production of plastic films. It can be begun favourably in all asset areas, possible in which a force application is only at a course side, for example rear order works for coating material, where can become introduced on the coated course side no force. In these asset areas it serves preferred as master drive, which gives the web speed exact, or as actuator for the control of the course curve.

The drawing roll contains a jacket 1, which is more drivable rotary and exhibits on its entire outer surface air intake openings. The air permeability of the jacket 1 becomes by a variety of bores, by manufacture from a porous material etc. effected. Additional one knows the outside outer surface with a verschleissfesten and/or the friction to the web 2 increasing coating from rubber, ceramic etc. coated its. In order at the same time to avoid the air flows between the web 2 and the outside outer surface to comparison-moderate and drawing on the web 2, the outer surface is preferred with one plastic or metal filter occupied.

The jacket 1 is as thin walled ones as possible from steel, aluminium or from a fiber reinforced plastic material (GRP or CFK composite) made, in order to reduce its weight and its mass inertia.

The interior of the jacket 1 is by radial, over the rolling-prolonged extending partitions 6 in chambers 7.8.9 divided, in which separated in each case pressure ratios adjusted to become to be able. The partitions 3.4.5.6 are part of an interior construction unit fixed in the operation and exhibit at their radial ends frictionless, to seals 10 handing to the inner surface of the jacket 1. Preferred one consists the interior construction unit of an outside, coaxial tube 11, 3.4.5.6 radial outward fixed on which the partitions are extending and which is into an appropriate number of distribution chambers 12.13. 14

divided, extending to the roll axle, over openings 15, 16, 17 with the vacuum chambers 7, 8, 9 in connection. The distribution chambers 12, 13, 14 are at an axial end of the tube 11 in each case to one negative pressure or pressure line 18, 19, 20 connected, in order to adjust the subsequent more near explained pressure ratios in the individual chambers 7, 8, 9. Additional one is the entire interior construction unit around the roll axle rotatable journaled, in order to be able to adjust the position of the segmentförmigen chambers 7, 8, 9 relative to the looping range of the web 2. Preferred one the made rotation of the interior construction unit motor with a servomotor, which becomes of one tax or control device controlled. Tax or the control device the positioned interior construction unit after predetermined algorithms, the certain physical properties of the web, for example their porosity, and certain operatingvariable, for example the web speed, when parameters contain.

In the present embodiment the distribution chamber 14 of a coaxial 11 innertube disposed in the outer tube becomes 21 formed, which is 9 connected over a nozzle with the chamber. Them are 20 connected to the pressure line, while the distribution chambers standing with the vacuum chambers 7, 8 in connection are 12, 13, 18, 19 connected to the vacuum pipings. The distribution chambers 12, 13 become 22 formed between the outer tube 11 and the innertube 21 by corresponding partitions.

Essential one for the drawing roll according to invention is that inside two vacuum chambers subjectable with vacuum 7, 8 present are, whose vacuum is independently more adjustable. The two vacuum chambers 7, 8 are in circumferential direction of the roller immediate successive disposed, whereby in the vacuum chamber 7 front in running direction of the web 2 (= rotational direction of the drawing roll) a larger vacuum is more adjustable than in the subsequent vacuum chamber 8, which is subjectable with vacuum however likewise. The first vacuum chamber 7 covers an angular range from at least 10, preferred 20 to 90, the second vacuum chamber 8 covers an angular range of at least 20. Preferred one covers the second vacuum chamber 8 a larger angular range than the first vacuum chamber 7. The entire suction angles of both vacuum chambers 7, 8 is at least as large as the wrap angle of the web 2, which amounts to 30 to 240.

With the preferable embodiment a pressure chamber 9 follows inside the jacket 1 after the second vacuum chamber 8, becomes generated in which an overpressure. In the range of the pressure chamber 9 due to the overpressure by the openings in the jacket 1 outgoing air the supported Abösen of the web 2 of the roller. The partition 5 between the vacuum chamber 8 and the pressure chamber 9 is disposed therefore along the generatrix, where the peeling of the web becomes 2 desired of the roller.

The interior of the jacket 1 is in the segment 23 between the pressure chamber 9 and the first vacuum chamber 7 neither to a compressed air supply nor to a vacuum piping connected, since this range neither from the web 2 umschlungen is the web 2 still there one affects. At both faces the segment exhibits 23 holes 35, effected by which a pressure equalization on atmospheric pressure becomes with leakages at partitions.

Before the operation of the drawing roll the interior construction unit with the partitions becomes 3, 4, 5, 6 so adjusted that the first vacuum chamber 7 is in the range, in which the web 2 on the roller accumulates. Preferred one the made adjustment in such a manner that the partition 4 between the two vacuum chambers 7, 8 is in the range of the desired accumulating line. The second vacuum chamber 8 is so designed and adjusted that it covers the looping range of the web 2. Subsequent one follows the pressure chamber 9 within the expiration range of the web 2. In the operation a vacuum between 1 kPa and 10 kPa adjusted in the second vacuum chamber 8 in the umschlungenen range, which depends on the sensitivity of the material and the web speed, becomes.

In the pre-aged chamber 7 a larger vacuum adjusted becomes. The pressure difference between the two chambers 7, 8 amounts to at least 0.5 kPa, preferred 1 kPa to 10 kPa. The larger vacuum in the first vacuum chamber 7 effected that when accumulating the web 2 on the roller the air boundary layer reduced appended at the web 2 becomes. It becomes such a Aufschwimmen of the web 2 on the appended air cushion and thus a displacement of the contact line web 2/Walze with the sequence prevented that itself the Kontaktfläche reduced. So also the large Kontaktfläche in the range of the vacuum chamber, sufficient with large web speeds, 8 possible it, the required tensile forces to transmitted. The independent adjustability of the vacuum in the vacuum chamber 7 possible it to adjust this in response of the web speed in order to stop so constant traction conditions. Preferred one becomes the desired vacuum in the first vacuum chamber 7 in response of the web speed and/or that Course course of one active-blaze to control means automated adjusted, for example as a regulating valve in the supply pipe becomes 18 the vacuum chamber 7 operated.

Likewise it is favourably possible to specify by a twist of the interior construction unit the position of the vacuum chamber 7 relative to the accumulating web 2 in response of the web speed in such a way that a maximum effective suction angle is adjusted.

In fig 2 is a longitudinal section transverse to the course direction of travel by a particularly favourable constructional embodiment of a drawing roll according to invention shown. This construction possible it to exchange the jacket very simple in order to adapt the drawing roll various webs materials and/or various web widths. So jackets 1 with adapted surfaces (rubber, ceramic, friction coatings etc.), particular embodiments and arrangements of the passage openings and/or particular air distribution mechanisms (air circulation slots can do, plastic or metal filters etc.) and/or with various widths of the suction surfaces the adaptation on the web width inserted become.

The innertube 21 and the outer tube 11 rich at the connection side in axial direction over the range of the jacket 1 outside and are rotatable journaled at their end not represented in fig 2 in the frame of the plant. The innertube 21 is there 18, 19 connected to the air supply line 20 and the divided outer tube 11 to the two vacuum pipings. At the opposite drive side the innertube 21 exhibits the pressure chamber 14 shifting pins 24, is 25 drawn over which a radial bearing, which is a recess of a bearing part 26 fitted. The bearing part 26 is in the frame 27 of the plant over a radial bearing 28 rotatably supported and connected over a turningrigid clutch with a not represented rotary drive. At its jacket 1 facing end of the bearing part 26 radial an outer annular side wall 29 is bolted on, their outer diameter the outer diameter of the jacket 1 corresponds. At the side wall 29 the jacket 1 with its front end is more releasable bolted on.

In the rolling inside the pressure tight range at both axial ends of likewise annular pressure bulkheads becomes 30, 31 limited, those fixed with the interior construction unit connected is and to the inner surface of the jacket 1 rich. The pressure bulkhead 30 at the drive side is 21 fixed on the outside of the innertube, the pressure bulkhead 31 at the

connection side on the outside of the outer tube 11. At the pressure bulkheads 30, 31 is at the same time the partitions 3.4.5.6 with their axial ends fixed. At the connection side contain the storage the jacket 1 a radial bearing 32, whose inner race fixed sits on the outer tube 11. The outer race is fixed 33 connected with an annular bearing part, over which a second annular side wall 34 drawn is more releasable screwed and onto this. At the annular side wall 34 the connection-lateral end of the jacket is 1 fixed. The side wall 34 exhibits likewise holes 37, which make from the outside a pressure equalization into the range between it and the pressure bulkhead for 31 and thus over the bores 35 also in the segment 23 and in the range between the pressure bulkhead 30 possible and the side wall 29.

The foregoing described adjustment from the tubes 11, 21, the pressure bulkheads 30, 31 and not in fig 2 represented partitions 3.4.5.6 of existing interior construction unit made in such a manner that this becomes rotated around the radial bearings 25, 32 into the required position. In the operation the rotated jacket 1 around the two radial bearings 28, 32.

A change of the jacket 1 can become very simple performed, as in the Zusammenbauzeichnung in fig 3 shown is: At the drive side the jacket 1 is unscrewed by the side wall 29 and at the connection side the side wall 34 by the bearing part 33. Subsequent one can become the jacket 1 and against differently designed jacket 1 exchanged withdrawn with the festverbundenen side wall 34 in axial direction. The design of the jacket 1 with the annular side wall 34 as replacement part has the other advantage that before the incorporation into the side wall 34 balancing bores introduced to become to be able.

In fig 4 is as schematic diagram the preferred apparatus shown, with which in the vacuum chambers 7, 8 and the pressure chamber 14 the required pressure ratios adjusted become. This apparatus required only a controllable Gefäß 38.

Alternative one is it possible to attach everyone vacuum or pressure chamber 7, 8, 9 over the lines 18, 19, 20 to own suck or Druckgebläse.

With the embodiment after fig 4 with only a blower 38 each vacuum piping contains of 18, 19, which leads to a vacuum chamber 7, 8, a controllable valve 39, 40, with which the required vacuum in each vacuum chamber 7, 8 adjust themselves lässt. Before the two valves 39, 40 the two vacuum pipings are 18, 19 combined to a line, which is 38 connected at the suction side of the blower. An other pressure regulating valve 42 contains the line 41 connected at the pressure side of the blower 38, before it over a Schaum absorber 43 in the free leads. Before the pressure regulating valve 42 the pressure line guiding to the pressure chamber 9 is 20 connected at the pressure line 41, which likewise contains a pressure regulating valve 44, in order to be able to regulate the overpressure in the pressure chamber 9. The circuit after fig 4 possible it to adjust in each chamber 7, 8, 14 individual and controllable pressure ratios. Preferred one the made adjustment of the pressure ratios in the individual chambers automated by means of active-blaze control means, of which the valves become 39, 40, 42, 44 in response of the web speed and/or the course course controlled.